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MATERIALS SURVEY

# BEDDING FEATHERS AND DOWNS

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FOREWORD

This report is one of a series which the Tariff Commission is preparing on selected industrial materials. The materials covered in this series are mainly raw materials which are of special interest in connection with the mobilization of the Nation's resources for defense. However, the series also includes some more advanced, or intermediate, products which are materials for further manufacture.

The general objective in each report is to present in concise form background facts bearing on the outlook for supply and demand in the years immediately ahead. The reports in this series summarize for each material salient economic and statistical information on uses, consumption, United States production, imports and exports, and other data pertinent to United States needs and supplies. The individual reports in the series are being released as rapidly as they are completed.

In the preparation of this report the Tariff Commission had the services of William T. Hart and other members of its staff.

(TC27299)



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## BEDDING FEATHERS AND DOWNS

### Introduction

During World War II, waterfowl feathers and down--feathers and down of common barnyard ducks and geese--became of strategic importance when our armed forces recognized the utility of this commodity for military sleeping bags and flying suits. The combination of qualities inherent in waterfowl feathers and down--a very high degree of insulation, lightness of weight, compressibility, and resiliency--is not duplicated naturally or artificially in any other product.

Although a very large quantity of feathers is consumed in the United States each year in the production of such articles as pillows, beds, comforters, and upholstered furniture, little public attention is given their use in the normal peacetime economy. The Korean conflict and the general preparedness program, however, have again focused attention on the military uses of waterfowl feathers, feathers for which the United States depends largely upon imports. As the domestic supply of these feathers would be far below the quantity required in the event of all-out war, they are being stockpiled against such an emergency, and virtually the entire supply of both new and used goose and duck feathers and down is being reserved for defense requirements pursuant to an order issued by the National Production Authority on April 16, 1951. This report deals with all types of feathers--chicken and turkey, as well as waterfowl--which are used for bedding, but primary attention is given to waterfowl feathers and downs because of their importance in national defense preparations.

## Description and Uses

Birds have three kinds of feathers: Contour, down, and filoplume. Contour feathers are feathers which form the outline of a bird. The contour feathers on the body of a bird are usually soft and pliant, while those on the wings, known as "flight feathers," and those of the tail have very rigid stems and hard, smooth surfaces. Down feathers, which are usually found only on waterfowl, such as ducks, geese, swans, and gulls, form a thick undercoating generally hidden by the contour feathers. The important difference between down and contour feathers is that a down feather consists of an irregularly spherical mass of fibers emanating from a common quill point and extending in all three dimensions, whereas a contour feather consists of a rigid central quill shaft or stem from which fibers extend on two sides, giving the feather essentially two dimensions, length and width. Differences in structure between the fibers of down and the fibers of contour feathers make down a better insulator and, on the whole, more resilient than contour feathers. These advantages, together with the facts that there is a relatively great demand for down and that only about 18 percent of a waterfowl's plumage is down, make down commercially much more valuable than contour feathers.

Filoplumes are degenerate structures having a superficial resemblance to hair and appearing in small clusters around the base of contour feathers. Contour feathers and downs both have several commercial uses; filoplumes have none.

The term "feathers" is used in this report to designate contour body feathers, and the term "down" to designate pure down. Contour body feathers and down are used chiefly as filling materials in bedding and upholstery, and when used for such purposes are commonly called bedding feathers. Flight feathers are not ordinarily used as a filling material because of the very large stem and stiff fibers. The resilience of feathers and downs makes them particularly suitable as a filling material in chair and sofa cushions and in pillows. Because feathers and down, especially down, are one of the best forms of insulation and are extremely soft and light in weight, they are an unexcelled filling material for comforters, sleeping bags, flying suits, and certain types of winter clothing. Contour body feathers used as filling materials are obtained chiefly from domesticated ducks, geese, chickens, and turkeys, and down is obtained chiefly from ducks and geese.

Contour body feathers generally have a slight curve from base to tip. The greater the curvature, the greater the resilience of the feather, and consequently, the greater its value for filling purposes. Goose feathers have the greatest curvature, duck feathers are less curved, and chicken and turkey feathers are almost flat. Pure down has a greater resilience than any kind of feathers. Goose feathers have numerous down-like fibers at the base; these fibers enhance the resilience of the goose feathers, and hence their value. Duck feathers have fewer such downy fibers, and chicken and turkey feathers have none.



Although the color of feathers and down has no relationship to their qualities as filling materials, it affects their commercial value. Actual colors vary, but feathers are classed commercially as white and gray, white feathers bringing a higher price than gray feathers of comparable quality. White feathers of all kinds and gray goose feathers are uniform in shade. "Gray" duck, chicken, and turkey feathers are mixtures of variously colored feathers.

Feathers and downs are used in several forms for filling purposes. While the bulk are simply cleaned and used in their natural state, others are further processed. "Stripped feathers," or "schleiss," are feathers which have been torn along the stem to loosen the down-like fibers and clusters at the base of the stem. These loose fibers, like natural down, are combined with other feathers to give increased resilience. In central Europe white goose feathers are sometimes treated in this way to increase their value. Small stripped feathers are often added to commercial mixtures of feathers and down to enhance their volume for filling purposes. "Chopped feathers" have been put through a machine designed to cut them in half. "Curled feathers," also called "crushed feathers," have been passed through a curling machine in which some of the feathers are actually curled, although most of them are merely crushed and broken into their constituent fibers. Large feathers of little value are usually chopped or crushed, and thus converted into a soft, fibrous mass which has some filling qualities. "Feather fiber," the fiber separated from this soft mass of broken quills and feathers by "blowing," is sometimes used as an adulterant of down. Chicken feathers are frequently curled or crushed.

Feathers and down, after being cleaned, are mechanically separated into pure down and feathers of graduated sizes. These components are then remixed in percentages suitable for the intended use. For upholstered furniture a favored mixture is 50 percent down and 50 percent goose feathers. Better grades of furniture contain a mixture of as much as 70 percent down with 30 percent goose feathers, while lower grades contain as little as 20 percent down with 80 percent duck feathers. Chicken feathers are not ordinarily used in upholstered furniture, except as an adulterant. Various mixtures of waterfowl feathers and down go into comforters and pillows. Specifications for the sleeping bags used by the armed forces call for a mixture of 40 percent down and 60 percent waterfowl feathers of a certain size. Chicken feathers are largely used in the United States and some parts of Europe in inexpensive pillows. Turkey feathers are frequently mixed with chicken feathers and sold as chicken feathers.

### World Production and Trade

The natural superiority, for filling purposes, of waterfowl feathers and down over chicken feathers determines in general the pattern of world production and trade in bedding feathers. In many parts of the world chicken feathers are not considered even a possible substitute for waterfowl feathers as a filling material, and though modern processing methods and the development of mechanical means of curling and crushing have made chicken feathers usable in inexpensive pillows, they have found but a limited acceptance, and that only in the United States and some parts of

western Europe. The price of chicken feathers has usually remained so low as to warrant collection of only a very small part of the potential supply. The eastern European countries and China, where ducks and geese are important in the diet, provide the bulk of the world supply of bedding feathers.

World commercial production of crude bedding feathers during the late 1930's is estimated to have exceeded 70 million pounds annually. About half this amount was produced in eastern Europe--Hungary, Poland, Yugoslavia, Rumania, Czechoslovakia, and the Soviet Union; about one-fourth in China; and the remaining fourth in the United States. Waterfowl feathers comprise roughly 90 percent of the production of all countries except the United States, where less than 10 percent of production is waterfowl feathers, the rest being chicken feathers. The collection of chicken feathers in the United States increased substantially during World War II, and has since remained at a higher level than in prewar years. Although a reliable estimate of postwar world production of feathers is not available, the trade reports it to be considerably below that of prewar years.

In general, feathers move in international trade from eastern Europe and eastern Asia to western Europe and North America. Before World War II, Germany and the United States were the largest consumers of feathers. Germany, however, was by far the most important consumer of waterfowl feathers--the feathers which move in international trade--and consequently usually dominated the world market. German imports of crude bedding feathers reached almost 19 million pounds in some prewar years, nearly double



the largest amount ever imported by the United States in any year. The United States, nevertheless, is one of the principal importers of waterfowl feathers.

Because the United States raises relatively few waterfowl, this country depends on imports to supply about 85 percent of its demand for waterfowl feathers. On the other hand, the United States is the world's largest producer and exporter of chicken feathers, making shipments principally to western Europe.

Table 1 shows exports of bedding feathers from the principal producing countries, by declared destination, for 1938, one of the few years in which separate export data for most of the producing countries are available. The data shown are representative of the relative output of the principal producing countries and the distribution of trade prior to World War II. International trade in feathers in 1938, however, was, for several reasons, only about 80 percent as great as in the immediately preceding and following years; the quantities shown for each country, therefore, should not be taken as representative of the absolute amount of prewar exports. Data for exports from the Soviet Union and Taiwan (Formosa), also important sources, are not available; consequently, no combined totals are given in the table.

Table 1.--Bedding feathers: Exports from principal countries, 1/ by declared destination, 1938

(In thousands of pounds)

Country	Total	Declared destination				
		Germany	United Kingdom	Hong Kong	Denmark	United States
China-----	8,133	2,575	135	<u>2/</u> 4,156	338	449
Hungary-----	5,562	4,292	242	-	165	499
United States--	5,072	10	2,225	-	1,928	-
France-----	4,963	498	1,779	-	534	248
Poland-----	4,478	901	3	-	803	386
Yugoslavia----	2,757	2,721	4	-	-	2
Rumania-----	1,728	1,406	-	-	258	-
Czechoslovakia	1,551	885	66	-	58	187
Italy-----	1,367	1,266	8	-	-	2
Declared destination--con.						
	Austria	Switzer-land	France	Czecho-slovakia	Norway	Yugo-slavia
China-----	-	-	132	-	31	-
Hungary-----	121	17	72	131	-	-
United States--	-	-	177	13	394	11
France-----	384	711	-	-	-	-
Poland-----	616	83	203	247	-	388
Yugoslavia----	<u>3/</u>	-	4	23	-	-
Rumania-----	-	-	-	40	11	-
Czechoslovakia	167	36	88	-	1	-
Italy-----	-	48	31	2	-	-
Declared destination--con.						
	Italy	Sweden	Belgium-Luxembourg	Nether-lands	Canada	All other
China-----	-	-	26	-	-	291
Hungary-----	7	5	<u>3/</u>	11	-	-
United States--	-	-	19	5	186	104
France-----	-	-	206	182	-	421
Poland-----	326	255	-	-	-	267
Yugoslavia----	3	-	-	-	-	-
Rumania-----	-	12	-	-	-	1
Czechoslovakia	12	1	1	5	6	38
Italy-----	-	-	-	-	-	10

1/ The Soviet Union and Taiwan (Formosa) are also large producers of bedding feathers, but statistics on exports of feathers from these countries in 1938 are not available. Exports from Taiwan in 1950 amounted to 1.7 million pounds.

2/ Hong Kong is a point of transshipment of feathers chiefly from southern China, but also from other oriental countries, to European and American markets. In 1938, 31 percent of feather exports from Hong Kong went to Germany, 31 percent to the United States, and 27 percent to the United Kingdom.

3/ Less than 500 pounds.

Source: Compiled from official statistics of the governments of the exporting countries.

Europe

The annual collection of feathers in Europe (including European Russia) in prewar years is estimated to have ranged from 30 to 40 million pounds. Though data are not available on postwar production of most of the European countries, the general consensus of the trade is that postwar collections have not **reached** prewar levels. This lower production is due partly to the disruption caused by World War II, but also, it is asserted, to the effect of changed governmental policies in eastern Europe. The general size of flocks has been substantially reduced by land reform programs, and reportedly also by absolute limitations on the number of fowl a private individual is permitted to own. About 65 percent of European output (in quantity) is goose feathers, 25 percent duck feathers, and 10 percent chicken feathers; in value the proportion for chicken feathers is much lower. Some attempt is made to grade crude European feathers, but the grades are not standardized because of rather extensive sorting and separation of down from feathers at all levels of collection. In view of this lack of standardization, European feathers are usually sold by sample. Hungary and Poland are usually the most important European producers of feathers with the possible exception of the Soviet Union, for which precise data are not available. France is also a large producer; a considerable part of the reported exports of feathers from France, however, are actually reexports of feathers received from eastern European countries. Germany is a substantial producer, but it consumes virtually all of its domestic output, in addition to its large imports.



Roughly 75 percent of total output of the principal European producing countries is exported; for some of these countries, feathers rank among the first 10 export products. Before the war, the collection, processing, and exportation of feathers in Hungary and Poland was under the control of government-supported cartels. Since the war, exportation of feathers from all the eastern European producing countries has been under either direct control or general surveillance of the respective governments.

Western European countries--particularly Germany, the United Kingdom, and Denmark--are the principal consumers of feathers produced in Europe, but the United States is also an important market for these feathers. During the war, 75 percent of the German feather-processing industry was destroyed. This fact, plus the general inability of Germany and other western European countries to import goods in the years immediately after the war, resulted in a world price level for feathers lower than normal. Germany reentered the international market in 1948, the Federal Republic of Germany (which does not include the Soviet Zone) importing 600,000 pounds of crude feathers in that year, 6.3 million pounds in 1949, and 13.2 million pounds in 1950. This last figure is substantial in comparison with imports into all Germany in 1938 of about 18.7 million pounds. The increased buying by Germany after 1948 was one of the factors leading to generally higher feather prices throughout the world.



Asia

China is the world's largest single producer of waterfowl feathers. The annual collection of feathers in China in some prewar years amounted to almost 15 million pounds, virtually all of which were waterfowl feathers. Feather collections in China since World War II have been substantially below those of prewar years, for several reasons. Production in China has been hampered by a long period of war and internal unrest. In the late 1930's the strong effort of the Japanese Government to gain complete control of China's feather trade badly disorganized the normal Chinese collection channels. More recently, control of exports by the Chinese Communist Government, and the limitation of the export trade in feathers to barter for heavy machinery and similar products have reportedly discouraged collection. In addition to these more direct influences, the price of feathers in the immediate postwar years was generally depressed in relation to prices of other products because of the absence of Germany and other important feather consumers from the market, and this tended to decrease collection in China, as elsewhere.

In contrast to European production, which is predominantly goose feathers, China's production is usually 70 to 80 percent duck feathers. Chicken feathers appear in trade in China only as an adulterant of waterfowl feathers. Feathers produced in China are sold in several standard grades, designated usually by the kind of feather (duck or goose), the area where the feathers originated, the minimum down content, and the maximum dirt and chicken-feather content. Exporters

feel it is to the general advantage of the Chinese trade to maintain these standard grades. As these grades are more easily maintained with crude feathers, extensive sorting or manipulation by primary collectors is discouraged, and processing by them is limited to drying, dusting, and the removal of quills and excess chicken feathers.

Feathers are collected in China almost entirely for export; not more than 2 percent of the output of that country is retained for domestic use. Shanghai is normally the largest center of collection and export, handling the feathers which originate in northern China. Pre-war trade through that port was usually well over 60 percent of the total for the country. Feathers from southern and central China are exported chiefly from the Chinese port of Canton to Hong Kong, where they are transshipped to world markets. Hong Kong is normally the second most important feather center in the Orient, receiving for processing and reexport feathers from Indochina, British Malaya, Siam, Burma, Indonesia, and other oriental countries, in addition to those received from China.

The season for delivering feathers to the large traders and exporters in Shanghai and Hong Kong runs from September to May, the largest volume reaching these centers in December and January. Exports are sold by the picul of  $133\frac{1}{3}$  pounds and shipped in compressed bales of approximately 420 pounds from Shanghai and approximately 150 pounds from Hong Kong. Before World War II, Germany was usually the principal market for China's feather output, receiving in some years

almost half of that country's total feather exports (including exports through Hong Kong). The United States ordinarily was second in importance, and the United Kingdom third. Denmark also received substantial quantities. Exports from China in 1947, the latest year for which statistics are available, amounted to 5.8 million pounds, less than half the average prewar level.

Taiwan (Formosa) is also the source of a substantial quantity of feathers. Data on prewar exports from Taiwan are not available; exports in 1950 amounted to 1.7 million pounds.

#### Production and Trade in the United States

##### Consumption

United States consumption of crude bedding feathers since World War II is estimated to have ranged from 25 to 30 million pounds annually. Roughly one-third (8-10 million pounds of the total quantity) was imported waterfowl feathers, about 5 percent (1-2 million pounds) was domestically supplied waterfowl feathers, and the remainder was chicken feathers from domestic sources.

A steadily increasing population has resulted in a long-term upward trend in United States feather consumption. The growth of the feather-processing industry and the increase in the commercial trade in feathers, however, have been much greater than the actual increase in feather consumption. Before World War I, most bedding feathers used in the United States came from waterfowl raised in this country, and a very large part was used by the farm family which raised the ducks and geese for



meat. Commercial collection was small and was not centralized to the extent that it is today. The large commercial demand for feathers developed chiefly from the necessity of supplying a greatly increased urban population with pillows and other bedding articles, and from the gradual change on the part of farm families to a practice of buying these articles formerly made in the home largely from home-raised feathers. The great decrease in waterfowl on American farms, necessitating the importation of waterfowl feathers, and the increased use of chicken feathers, which must be curled or crushed by machinery before they can be used in fillings, have also contributed to the growth of the commercial feather business.

The rate of increase in the consumption of pillows, down comforters, and furniture stuffed with feathers has been greater than the rate of increase in national income. Consumption of such articles since World War II has been abnormally high because virtually no waterfowl feathers were available for civilian use during the war. The effect of the accumulated demand continued until 1949, when consumption began to decline.

The demand for feathers in the United States increased very substantially during World War II, owing to the need of the greatly enlarged armed forces for pillows and sleeping bags. Pillows for barracks use are filled with chicken feathers; those for hospital use, with waterfowl feathers. Sleeping bags, particularly important for warfare in cold climates, are filled with waterfowl feathers. The defense preparations now under way are again resulting in a large military demand for feathers.



## Production

United States commercial collection of crude feathers since World War II is estimated to have ranged from approximately 18 to 23 million pounds annually; waterfowl feathers accounted for about 1.5 to 2 million pounds, and chicken feathers for the remainder. In addition to these feathers commercially collected and processed, some feathers, chiefly waterfowl, are still being saved and used by farm families. Official statistics on domestic production either before or since World War II are not available.

Waterfowl feathers are produced in the United States principally on commercial duck farms, many of which are located on Long Island, New York. Because the Long Island farmers, the predominant group in the market, raise Pekin ducks, commercially the most successful breed, ducks of that species are known throughout the country as Long Island ducks. Feathers from this source are taken from "green" ducks (those about 8 weeks old); these feathers do not have the full growth of feathers from mature birds. Total output of crude "Long Island duck" feathers is about  $1\frac{1}{4}$  to  $1\frac{1}{2}$  million pounds annually. The commercial duck farmers, who slaughter their own birds and prepare them for market, collect the feathers and sell the bulk of them through a cooperative sales agency which acts as the sole agent for members of the Long Island Duck Growers Association. Crude feathers sold by this agency, designated as XL Duck or XLDUX feathers, are usually much cleaner than other crude domestic feathers and crude feathers imported from China.

The Midwestern States, particularly Ohio, Illinois, Iowa, and Minnesota, supply commercially from 300,000 to 500,000 pounds of crude waterfowl

feathers annually. Most of these feathers come from mature birds raised on small farms and sold to large packing plants for slaughter. The chief center of collection is Chicago. Because these prime domestic "Western" feathers are full size and a large proportion of them are goose feathers, they are generally superior to the Long Island duck feathers, which come mainly from "green" ducks.

Table 2 shows that there has been a long-term decline in the number of waterfowl, especially of geese, in the United States, and hence in the potential supply of waterfowl feathers available from domestic sources. Between 1890 and 1940 this decline produced a drop in the per capita ratio of the number of waterfowl to the population of the United States from .25 to .02 bird per person.

Table 2.--Ducks and geese: Number on reporting farms in the United States on specified dates, 1890 to 1940

(In thousands)				
Date	:	Ducks	:	Geese
	:		:	
1890 (June 1)-----	:	7,544	:	8,440
1900 (June 1)-----	:	4,786	:	5,677
1910 (Apr. 15)-----	:	2,907	:	4,432
1920 (Jan. 1)-----	:	2,818	:	2,939
1940 (Apr. 1)-----	:	2,460	:	635
	:		:	

Source: U. S. Bureau of the Census, Special Poultry Report, 1940.

Note.--The differences in the time of the year of the several censuses affect somewhat the comparability of the returns.

This long-range decline in the number of waterfowl in the United States has resulted largely from the use of chicken as the predominant fowl in the American diet. Within the last decade, however, this decline has been

accelerated by the high cost of feed and the encroachment of suburban housing developments upon the commercial duck-farming area of Long Island. The number of ducks and geese raised in a given year is larger, of course, than the number on farms on a specified date within that year. For 1939, for example, the Census of Agriculture reported 12.1 million ducks and 1.1 million geese raised in the United States, although in April 1940 only 2.4 million ducks and 0.6 million geese were on farms. 1/

The number of ducks raised commercially in a year depends upon the relationship between the cost of feed and the price the meat will bring. Geese are not raised on the same large-scale commercial basis as ducks. Duck production is usually highest when high prices of beef and pork encourage a larger demand for the less expensive meats, one of which is duck. Ducks for breeding are selected 1 year in advance of the time the raiser expects to market meat, and this practice determines within a certain range the volume of production 1 year in advance and limits the possibility of any sharp increase within a shorter period of time in the number of ducks available for marketing. It takes 8 weeks for a duck to reach the size at which it is most profitably marketed for meat.

Waterfowl feathers are only a byproduct of raising ducks and geese for meat, and the American farmer gives little consideration to the price of waterfowl feathers in determining the size of his flock. As a rule, however, feathers from commercially raised ducks are saved and marketed. Most feathers from ducks and geese slaughtered in large packing plants are also saved. Eight or nine commercial "green" ducks (8 weeks old) are required

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1/ U. S. Bureau of the Census, Special Poultry Report, 1940.



to supply 1 pound of feathers and down (excluding wing and tail feathers), whereas about five mature ducks or three mature geese will supply the same amount.

The potential supply of chicken feathers available annually in the United States has been estimated at 100 million pounds, a very large quantity. Actually, however, only about one-fifth of this amount, or 20 million pounds, has ever been saved and marketed as feathers in any one year. The remainder is either used as fertilizer or dumped as trash.

The use of chicken feathers in the United States has been increasing steadily for some years. Collection was once chiefly in Chicago packing plants, where feathers from mature fowls were saved. These, marketed as "prime western" fowl feathers, represented the very best quality of chicken feathers. In the last decade or so, however, chicken-feather processing plants have been established in the large broiler-raising areas of the Middle Atlantic States. Although feathers from broilers do not have the same fullness and stuffing capacity as mature western feathers, broiler feathers are the predominant type of chicken feathers used today, chiefly because their collection is more economical. Firms processing and using broiler feathers usually operate in conjunction with large central poultry slaughter houses. The most modern establishments are highly mechanized, and the chicken feathers are cleaned and put into pillows within a short time after they are plucked from the bird.

United States commercial production of chicken feathers tends to fluctuate more widely than the production of waterfowl feathers. A lag in demand for feather articles appears first in the articles containing



chicken feathers; as the price of these feathers is generally low, a slight decrease in prices will halt collection in marginal packing plants which own or control no processing facilities. Although the potential supply of chicken feathers is very great, any large and unexpected increase in demand, such as would result from a sudden expansion in the need for pillows by the armed forces, is usually accompanied not only by a substantial rise in the price of chicken feathers but also by a temporary shortage until new centers of collection are established.

The process of washing, drying, sorting, and crushing or curling feathers requires specialized equipment. Such equipment usually is custom-built on the basis of specifications of the individual firm according to its experience in processing feathers, and therefore, while the equipment of all firms is based on the same general principles, it is by no means standardized throughout the industry. Very little skilled labor is required in processing feathers.

The feather-processing facilities in use in the United States (which are used for processing both domestic and imported feathers) have been ample to handle all feathers available up to the present, largely because each great and sudden increase in United States demand for feathers has been accompanied by circumstances which cut off a substantial part of imports. If sufficient quantities of all types of feathers in demand had been available at these times, however, the industry would probably have felt a shortage of processing facilities.

Imports

Import trends.--There has been a long-term upward trend in United States imports of crude bedding feathers (designated in trade statistics as "Crude feathers for beds"), because of an increasing demand for feather products and a decreasing domestic supply of waterfowl feathers. Imports have always consisted almost entirely of waterfowl feathers; the quantity of chicken bedding feathers imported is insignificant. Virtually all bedding feathers imported are in a crude condition because crude feathers have a favorable differential, as compared with processed feathers, in shipping costs. In addition to this substantial advantage in ocean shipping rates on crude feathers, the United States tariff on crude feathers was lower than that on processed feathers prior to December 11, 1950. Since that date, the duties on crude and processed feathers have been the same. Imports normally supply about 85 percent of United States consumption of waterfowl feathers.

United States imports of crude feathers for beds, by principal sources, for representative years, are shown in table 3. Processed bedding feathers are not reported separately in import statistics, but imports are not large.

Table 3.--Crude feathers for beds: United States imports for consumption, by principal sources, specified years 1937 to 1950 and January-May 1951

Country	1937	1939	1940	1941	1948	1949 <u>1</u> /	1950 <u>1</u> /	Jan.-May 1951 <u>1</u> /
	Quantity (1,000 pounds)							
Eastern Asia:								
China-----	2,803	4,579	7,931	7,602	7,326	6,260	5,035	1,239
Hong Kong-----	500	77	151	382	20	38	30	262
Other-----	168	220	446	383	13	116	180	473
Total-----	3,471	4,876	8,528	8,367	7,359	6,414	5,245	1,974
Eastern Europe:								
Poland and								
Danzig-----	671	242	19	-	268	470	486	151
Hungary-----	512	474	335	3	1,360	783	422	110
Czechoslovakia--	142	23	-	-	428	246	222	71
Soviet Union---	8	26	32	145	46	81	126	-
Yugoslavia-----	1	4	8	-	106	56	67	15
Rumania-----	30	28	25	-	254	155	22	18
Bulgaria-----	-	40	32	-	-	-	-	-
Total-----	1,364	837	451	148	2,462	1,791	1,345	365
Western Europe:								
France-----	283	439	86	34	222	137	216	86
Germany <u>2</u> /-----	40	38	7	<u>3</u> /	7	36	68	23
Italy-----	2	35	11	4	482	239	38	52
Belgium and								
Luxembourg---	2	11	-	-	13	24	23	34
Netherlands----	-	-	-	-	24	<u>3</u> /	21	4
United Kingdom--	129	59	292	156	51	63	19	<u>3</u> /
Other-----	139	5	31	106	167	26	50	7
Total-----	595	587	427	300	966	525	435	206
Other areas, total-----	26	20	49	161	70	53	73	53
All countries, total-----	5,456	6,320	9,455	8,976	10,857	8,783	7,098	2,598

See footnotes at end of table.



Table 3.--Crude feathers for beds: United States imports for consumption, by principal sources, specified years 1937 to 1950 and January-May 1951--Con.

Country	1937	1939	1940	1941	1948	1949 <u>1</u> /	1950 <u>1</u> /	Jan.-May 1951 <u>1</u> /
	Foreign value (1,000 dollars)							
Eastern Asia:								
China-----	1,001	1,005	1,974	2,818	3,163	3,339	4,122	1,411
Hong Kong-----	151	16	29	127	12	32	28	366
Other-----	65	46	89	81	3	47	105	421
Total-----	1,217	1,067	2,092	3,026	3,178	3,418	4,255	2,197
Eastern Europe:								
Poland and Danzig-----	695	201	10	-	171	383	575	232
Hungary-----	475	345	278	7	967	793	672	245
Czechoslovakia-	118	19	-	-	302	251	260	135
Soviet Union---	3	11	19	98	95	114	169	-
Yugoslavia-----	2	3	12	-	94	61	214	65
Rumania-----	18	12	7	-	114	103	19	37
Bulgaria-----	-	36	19	-	-	-	-	-
Total-----	1,311	627	345	105	1,743	1,705	1,909	714
Western Europe:								
France-----	267	438	68	24	257	211	526	293
Germany <u>2</u> /-----	39	31	4	<u>4</u> /	14	91	124	110
Italy-----	3	27	11	4	295	159	114	154
Belgium and Luxembourg---	4	4	-	-	21	16	48	72
Netherlands----	-	-	-	-	20	<u>4</u> /	22	6
United Kingdom-	69	43	131	99	44	52	25	3
Other-----	91	5	15	61	490	13	76	29
Total-----	473	548	229	188	1,141	542	935	667
Other areas, total-----	16	10	26	84	55	40	51	46
All countries, total-----	3,017	2,252	2,692	3,403	6,117	5,705	7,150	3,625

1/ Preliminary.

2/ Includes Austria, 1939-41.

3/ Less than 500 pounds.

4/ Less than \$500.

Source: Compiled from official statistics of the U. S. Department of Commerce.



During the years immediately following World War I, the United States imported less than 1 million pounds of crude bedding feathers annually. Imports rose to about 2.2 million pounds a year in the early 1920's and remained at that level until 1934, when they began to increase sharply. In 1937, imports of crude bedding feathers amounted to 5.5 million pounds, with a foreign value of 3 million dollars, and in 1940, to 9.5 million pounds, valued at 2.7 million dollars. (The lower foreign value reported for 1940 was due primarily to the fact that in that year a larger proportion of the imports came from China, which generally exports a less expensive type of feathers than those from Europe.) World War II cut off all important sources of United States imports, and although efforts were made to develop secondary foreign sources, imports were very small, amounting in 1944 to only 347,000 pounds, valued at \$393,000. In the postwar years accumulated domestic demand for waterfowl-feather articles brought imports of crude bedding feathers in 1948 to their highest level--10.9 million pounds, valued at 6.1 million dollars. Imports decreased after that year, dropping to 7.1 million pounds in 1950, but the value in that year--namely 7.2 million dollars--was considerably greater than in 1948, the average unit value having risen from 56.9 cents per pound in 1948 to \$1.01 per pound in 1950. Part of this increase in unit value was the result of the progressive rise in feather prices after the reentrance of Germany and other European consumers into the world market in 1948, but the major part of the increase resulted from the abrupt rise in feather prices in the last half of 1950, when difficulties were met in procuring sufficient quantities of feathers from China to fill the greatly increased United

States requirements for feathers occasioned by large military orders.

Imports during January-May 1951 amounted to 2.6 million pounds, valued at 3.6 million dollars. This was a slight decrease in quantity but a large increase in value compared with imports in the corresponding period of 1950, when 2.8 million pounds, valued at 2.7 million dollars, entered.

China has usually supplied about 70 percent of United States imports of crude feathers for beds. Hungary and Poland are the second and third most important sources, with large quantities coming also from France, Czechoslovakia, Italy, Yugoslavia, and Rumania. The small imports during World War II came principally from Argentina, the United Kingdom, and the Soviet Union. United States imports of bedding feathers from China usually contain from 15 to 18 percent down, roughly the normal percentage found on the bird, although significant quantities of 90-percent pure down are also received from China. Imports from Europe, on the other hand, almost invariably contain a very high percentage of down. Special problems relating to current imports from China are discussed in a later section on procurement problems.

Tariff status.--The current tariff rate on imported crude feathers for beds is 20 percent ad valorem, the rate originally specified in the Tariff Act of 1930. In the General Agreement on Tariffs and Trade, signed at Geneva, Switzerland, in October 1947 the rate of duty on crude feathers was reduced to 10 percent ad valorem in negotiations with China, and this rate became effective on May 22, 1948. Upon China's withdrawal from this agreement in 1950, the United States concessions made to China on feathers were withdrawn, and the duty on crude feathers was restored

to the original rate of 20 percent ad valorem, effective December 11, 1950. Feathers, dressed, colored, or otherwise manufactured in any manner were originally dutiable under the Tariff Act of 1930 at 60 percent ad valorem, but, as a result of reductions in trade agreements, these feathers also are now dutiable at the rate of 20 percent ad valorem. As the United States must depend upon imports for the bulk of its supply of waterfowl feathers, and as most feathers have been imported crude, the tariff rate has not been a major factor affecting the volume of imports.

#### Exports

For many years the United States has been a large exporter of crude chicken feathers. On some few occasions, domestic waterfowl feathers have been exported, but not in significant quantities.

United States exports of crude feathers during the 1930's averaged approximately 6.8 million pounds, valued at about \$332,000, annually. The average unit value of exports during 1937-39 was about 5 cents per pound, compared with an average unit value of imports during the same period of about 45 cents per pound. The principal export markets were western European countries, particularly the United Kingdom, Denmark, France, and Norway. During the war, annual exports averaged only about 500,000 pounds, valued at approximately \$85,000, most of which went to Canada. Postwar exports (1946-50) have been less than half the prewar level in quantity, averaging annually 2.6 million pounds, but the value has averaged annually \$561,000. The average unit value of exports during 1948-50 was about 25 cents per pound, whereas the average unit value of imports during this period was about 71 cents per pound. France, Denmark, and Canada have been



the principal postwar markets. United States exports of crude feathers by principal markets in recent representative years are shown in table 4.

### Prices

There is no regularly published series of price quotations on feathers. The price of feathers from Europe varies with almost every individual shipment because there are no standard grades or mixtures in the European trade. Feathers from China, on the other hand, are sold in standard grades, and the prices of the various grades are uniform at any one time and well known throughout the market.

In the United States, feathers from China usually dominate the market, and their price determines the general price structure. As a rule, crude waterfowl feathers from China are less expensive than domestic or European waterfowl feathers, although this does not always hold true, because of variations in quality.

The price of chicken feathers is relatively stable; such fluctuations as do appear are frequently reflections of larger changes in the price of waterfowl feathers. There is a very wide spread between the price of chicken feathers and the price of waterfowl feathers and down--especially down.

The relative values of different kinds and grades of feathers are illustrated in table 5, which shows basic ceiling prices set by the Office of Price Administration in May 1943. These prices prevailed essentially unchanged for the duration of World War II. They were substantially higher than prewar prices, some being almost double the corresponding 1937-39 average.



Table 4.--Crude feathers: United States exports of domestic merchandise, by principal markets, specified years 1937 to 1950

Country	1937	1939	1944	1948	1949 <u>1/</u>	1950 <u>1/</u>
Quantity (1,000 pounds)						
France-----	663	154	-	469	660	918
Canada <u>2/</u> -----	113	253	270	444	522	553
Denmark-----	2,791	2,974	-	724	769	522
Italy-----	-	4	-	202	157	389
Germany <u>3/</u> -----	80	-	-	1	302	169
Belgium and Luxembourg-	38	44	-	38	76	67
United Kingdom-----	4,053	2,775	-	59	10	48
Ireland-----	80	64	-	7	-	22
Switzerland-----	-	65	-	5	139	14
Norway-----	310	478	-	51	74	-
Sweden-----	14	66	-	-	50	-
Union of South Africa--	22	3	-	50	12	7
All other-----	73	40	<u>4/</u>	46	58	30
Total-----	8,237	6,920	271	2,096	2,829	2,739
Value (1,000 dollars)						
France-----	37	12	-	114	230	340
Canada <u>2/</u> -----	9	26	104	109	145	125
Denmark-----	146	87	-	32	15	12
Italy-----	-	1	-	11	16	172
Germany <u>3/</u> -----	11	-	-	3	121	123
Belgium and Luxembourg-	3	2	-	3	24	31
United Kingdom-----	240	114	-	7	4	59
Ireland-----	5	2	-	1	-	1
Switzerland-----	-	24	-	2	42	12
Norway-----	21	18	-	4	1	-
Sweden-----	1	3	-	-	1	-
Union of South Africa--	2	<u>5/</u>	-	13	4	1
All other-----	10	8	<u>5/</u>	50	52	48
Total-----	485	297	104	349	655	924

1/ Preliminary.2/ Includes Newfoundland and Labrador beginning 1950.3/ Includes Austria 1939-44.4/ Less than 500 pounds.5/ Less than \$500.

Source: Compiled from official statistics of the U. S. Department of Commerce.

Table 5.--Bedding feathers and down: Basic ceiling prices set by the Office of Price Administration in May 1943

Kind	Maximum price per pound
<u>Crude feathers</u>	
Chicken and turkey:	
Prime colored body feathers.....	\$0.05
Prime white body feathers.....	.07
Butcher body feathers.....	.02
Waterfowl:	
Prime domestic goose feathers.....	1.37½
Prime domestic duck feathers.....	1.10
XL Duck or XLDUX (Long Island duck feathers).....	1.18½
Domestic duckling feathers.....	.93½
Chicago butcher goose and duck feathers.....	.77
New York butcher goose and duck feathers.....	.55
China goose feathers.....	.77
China duck feathers.....	.66
<u>Processed or manufactured feathers and down</u>	
Chicken and turkey:	
Colored.....	.13
White.....	.17½
Waterfowl:	
Domestic and European goose feathers:	
Down.....	5.38
Small feathers.....	1.18
Large feathers.....	.54
40 percent down, 60 percent small-feather mixture.....	2.85
Domestic and European duck feathers:	
Down.....	4.84
Small feathers.....	1.08
Large feathers.....	.48
40 percent down, 60 percent small-feather mixture.....	2.58
China goose feathers:	
Down.....	4.84
Small feathers.....	1.08
Large feathers.....	.48
40 percent down, 60 percent small-feather mixture.....	2.58
China duck feathers:	
Down.....	4.30
Small feathers.....	.97
Large feathers.....	.43
40 percent down, 60 percent small-feather mixture.....	2.30

Source: Compiled from Office of Price Administration Maximum Price Regulation No. 318, effective Feb. 5, 1943, and Amendment No. 1 to Regulation No. 318, effective May 15, 1943.

Prices of feathers immediately after the war were low relative to prices of other commodities, primarily because of the absence of the large European consuming countries from the market. Some grades sold at prices approximating the 1937-39 level. After 1948, however, when European consumers began to reenter the world market, prices started upward and have risen continuously since. International complications in Korea and China in 1950, with a resulting shortage of feathers, have caused prices of waterfowl feathers in the United States to rise to very high levels. Table 6 presents price ranges by quarters for three representative grades of feathers from China for the period January 1948 to December 1950 and for January 1951.

Table 6.--Bedding feathers and down: Prices c.i.f. New York City for three representative kinds of waterfowl feathers from China, by quarters, 1948-1950, and January 1951

Year and quarter	NN Gray duck feathers	GGS Gray goose feathers	Gray duck down
	<u>Per pound</u>	<u>Per pound</u>	<u>Per pound</u>
1948:			
January-March---	\$0.29-\$0.34	\$0.34-\$0.39	\$1.50-\$1.80
April-June-----	.28- .33	.35- .42	1.50- 1.80
July-September--	.32- .35	.39- .43	1.60- 1.72
October-December	.37- .43	.40- .51	1.75- 2.00
1949:			
January-March---	.40- .43	.48- .52	1.90- 2.00
April-June-----	.38- .40	.48- .52	1.80- 2.00
July-September--	.43- .55	.51- .60	1.70- 2.35
October-December	.51- .58	.60- .63	2.25- 2.45
1950:			
January-March---	.52- .59	.63- .75	2.30- 2.45
April-June-----	.55- .56	.62- .71	2.00- 2.25
July-September--	.63- .82	.62- .97	2.05- 3.10
October-December	.81- 1.00	.90- 1.15	2.75- 3.35
1951:			
January-----	1.05- 1.15	1.10- 1.20	3.25- 3.65

Source: Compiled from official documents of the U.S. Bureau of Customs.



## Problems in Current United States Supply and Procurement

Since the United States depends principally upon imports for waterfowl feathers, and since the bulk of world collection is in countries within the Soviet sphere of influence, this country has a difficult problem in supplying its military needs for these feathers. During World War II all available supplies of waterfowl feathers in the United States were reserved for defense use, and processing plants and centralized filling plants were maintained under Government control to assure procurement for military purposes. Even with these restrictions, the supply of waterfowl feathers was not sufficient to meet the requirements for filling sleeping bags for actual or potential use of troops in cold climates, though the number of troops actually stationed in cold areas was small.

The Korean conflict and the preparedness program brought a sudden increase in the military demand for waterfowl feathers. In the fall of 1950, these feathers were added to the list of items currently being stockpiled, and on April 16, 1951, National Production Authority Order M-56 again reserved for defense requirements the entire supply of new and used duck and goose feathers, except flight feathers with no natural curl. Surveys revealed, it was then announced, that the current supply of waterfowl feathers and down is insufficient to meet the demand for military sleeping bags and hospital pillows. In the event of a large-scale war, it is possible that the annual military demand for waterfowl feathers would exceed the greatest amount hitherto consumed in the United States in any year, and in that event, moreover, the quantity

of imports available would probably be much below normal. Even though a general war does not occur the continuance of extensive defense preparations may result in requirements for feathers which cannot be met owing to conditions in, or policies of, the Communist countries.

Up to the present no unusual difficulties have been encountered in procuring waterfowl feathers from Europe, even from the "satellite" countries, although some importers complained during 1950 of being outbid by German firms whose demand was rapidly increasing. Great difficulties, however, have been experienced during recent months in obtaining feathers from China. Since the advent of the Communist regime there, exports from that country have been under direct governmental control, which is said to have caused a smaller collection of feathers in China. In addition, the restrictive effects of international strife in the Orient began to be felt by the feather trade in the last half of 1950. By September of that year, United States imports of feathers shipped from Shanghai, usually the principal Chinese shipping port, had virtually ceased. Feathers from China entering the United States since then have come almost exclusively from Hong Kong.

As a result of Communist China's entry into the Korean conflict, the United States Treasury Department on December 17, 1950, froze all assets in the United States owned by Communist China or its nationals. 2/ After that date, transactions involving bank accounts, credits, and other assets in the United States owned by Communist China or nationals

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2/ Code of Federal Regulations, 1950 Cum. Supp. to 1949 ed., title 31, ch. V, pt. 500.

of that country were forbidden, unless licensed by Foreign Assets Control of the Federal Reserve Bank of New York. On March 7, 1951, the Department of the Treasury amended its initial regulations covering the control of these foreign assets to impose additional restrictions on the importation of merchandise from Communist China. 3/

In retaliation against the United States freezing order, the Chinese Communist Government forbade exportation from China of goods destined for the United States. Aside from this, the Communist regime inaugurated a policy of barter trade in certain Chinese export commodities, feathers being one of them. These commodities are to be traded only in exchange for machinery and similar goods needed by China. It is reported that China has completed such barter arrangements, involving feathers, with eastern Germany, and is negotiating similar arrangements with other eastern European countries.

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3/ After March 7, 1951, merchandise arriving in the United States from any country, if the country of origin of such merchandise is China (except Formosa), is not permitted entry until a specific license from Foreign Assets Control, Department of the Treasury, is presented. In general, the Department of the Treasury denies applications for license to import merchandise in which a Chinese interest has existed since December 17, 1950, the effective date of the freezing order with respect to China. Exceptions may be made when merchandise is of sufficient importance to the United States to warrant its admittance notwithstanding any Chinese interest, as is the case with waterfowl feathers. The Departments of Defense and Commerce advise the Department of the Treasury with regard to what merchandise may fall into this category. The Department of the Treasury presumes that there has been Chinese interest since December 17, 1950, in any goods of Chinese origin not imported into the United States by March 7. To overcome the presumption, it is necessary to present to the Federal Reserve Bank of New York specific and substantial evidence tracing all details of ownership and interest in goods offered for importation.



The Department of the Treasury's freezing order and the Chinese Government's retaliatory restrictions have greatly hampered the trade in feathers. In spite of the heavy military demand in the United States and unprecedentedly high prices for feathers in this country, United States imports of feathers decreased from 877,000 pounds in December 1950 to 306,000 pounds in January 1951. Monthly imports have increased almost steadily since then, however, as certain procurement and payment difficulties were partially overcome. By the end of May 1951 a total of 2.6 million pounds had been imported, 1.2 million pounds (about 47 percent) of which came from China. China has normally supplied about 70 percent of imports.

Satisfactory substitutes for waterfowl feathers are available for all important civilian needs and for most military needs except sleeping bags. Chicken feathers, of which there is an adequate domestic supply, can replace waterfowl feathers in all civilian pillows, and, if necessary, in military hospital pillows. Cotton, wool, kapok, milkweed fiber, and foam rubber are substitutes for feathers in various uses, though the supply of these materials for filling purposes probably would be curtailed in a total war. Filling military sleeping bags is the only important use of waterfowl feathers for which no other material is a really satisfactory substitute, but the requirements for this purpose alone are at present greatly in excess of available supplies. Because of the shortage during World War II, every known substitute was tested and none was found satisfactory for sleeping bags. The best substitute--though far from satisfactory--is curled chicken feathers mixed with waterfowl feathers and down, and this mixture was used



during the war. Renovated, or used, feathers also were put in sleeping bags during that period, and are being used today to augment supplies of new feathers, although in normal times the use of second-hand feathers is regarded unfavorably and is forbidden by the bedding laws of many States.

There is virtually no possibility that domestic production of new waterfowl feathers can be increased significantly. Thus if the demand which is in prospect for the immediate future is to be met, it will be met only by the entry of large imports. In the past United States imports have come mainly from China, and secondarily from eastern European countries, but the quantity imported recently from China has been notably smaller, as stated above, than in the period prior to the Korean conflict. The prospect is for continued uncertainty with reference to imports from China, although imports might conceivably increase in the event of an armistice in Korea, followed by reduced political tension between the United States and China.

Should imports from China continue at an abnormally low level, the effort would probably be made to obtain increased imports from eastern European countries. The success of these efforts would be determined largely by both political and economic developments. Since the governments of most of the eastern European countries are within the range of influence of the Soviet Government, it is possible that the same factors that resulted in a reduction in Chinese exports to the United States might reduce exports from eastern European countries as well. Moreover, the diversion to the United States of a substantially larger proportion of the eastern European waterfowl-feather output could be accomplished only

if feather consumption in Germany and Europe generally were greatly curtailed.

United States supplies may also be supplemented by larger imports from some Asiatic countries which normally have been rather minor sources of United States imports (such as Taiwan, Siam, Indochina, and British Malaya). The quantity available from these sources, however, is limited.

If, despite all efforts to obtain adequate supplies from abroad, total imports are drastically curtailed, the most promising source of waterfowl feathers for essential military use would probably be the collection of pillows and other bedding articles containing these feathers from homes throughout the United States.



















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